



Optical Scientific Inc.

## Answers to Recent Questions on OFS-2000F for Flare Stack Applications:

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*1. Do you have an engineering/configuration manual/guide that explains how to interface your system using RS-232 (and any other protocols you may use; e.g., RS-485, etc.)? We'll need a copy or suitable instructions concerning how data is formatted, registers, etc. What's the recommended/maximum allowable distance (in cabling) between the "transmitter" and our control system using the interface?*

**Answer:** Our manual covers in detail, how to interface to the OFS. A PDF version of the manual can be made available to you.

*2. If (for some unknown reason), we decide/need to use 4-20 mA DC (instead of the interface) to bring in the flow rate, what is the resolution of your D/A converters (e.g., 12-bit, 16-bit, ...?)*

**Answer:** The current loop uses a 16 bit D/A converter.

*3. What other information is available thru the interface besides the flow rate (e.g., density, molecular weight, etc.)?*

**Answer:** Through the serial RS232C interface, you have access to flow direction, flow rate, user selected measurement units, detector A and B carrier signal strengths, a four byte hex encoded system status code, the A to B correlation, the uncorrected raw velocity data, and calibration point values. As an option, opacity is also available.

*4. How many 4-20 mA DC analog outputs are provided; is there a maximum number?*

**Answer:** One current loop (for flow rate) is standard. We have engineered a new version interface board that can handle two current loop outputs, with the second being used for opacity.

*5. What kinds of status information are available thru the interface (e.g., "fault," other)? Are dry contacts available to provide status?*

**Answer:** The RS232C data stream provides a number of system stats in the status code, as outline in the user's manual. There are also two sets of NO / NC dry relay contacts, one to indicate an error condition exists, and the other to indicate the unit is temporarily in its calibration cycle. There is also a user input that by shorting the two contacts, the user can initiate an immediate calibration cycle (useful for users that want to allow their DAS equipment to control the calibration cycle).

*6. What is the exact NEC rating for the OFS?*

**Answer:** The OFS has not been formally rated by the NEC as to a specific degree of explosion proof, etc. However, the unit is well shielded and sealed and contains no relays or similar spark inducing components that are of key concern in environments with potentially explosive gases. The NEMA4 packaged OFS can be ordered with a "Z Purge Option" which provides purge fittings on the NEMA4 box and on both sensor heads for Class I / Div I & II applications. (Note that the OFS is certified with UL, CSA, IEC and Entela.)

**7. What is the exact temperature rating for the Optical Flow Sensor (OFS)?**

**Answer:** The spec for the operational environment (around the equipment housing) is -40 to +140F. For flow gas temperatures, we have been tested in actual applications to over +1200F. For flow gas temperatures above 150F and positive port pressure, we recommend gate valves to allow the heads to be removed or serviced easily without danger to the technician. Working with gas temperatures higher than that should be no problem, but is dependant on the degree of pressure involved and the ambient temperature and the presence or absence of gate valves.

**8. What is the exact pressure rating for the OFS?**

**Answer:** The OFS has been tested for port side pressures of up to 120 PSI, with no negative effects.

**9. Do you have an arrangement the “shoots through a full-port isolation valve? Does it come with an isolation flange with the glass opening?**

**Answer:** Assuming you are speaking of some kind of valve arrangement to close off the sample port, yes -- we recommend and can provide a standard gate valve (no glass windows) when positive stack port pressure is present. Also, our extension flanges and Kapton gaskets (both standard) provide a high degree of temperature isolation for the transmit and receive head electronics.

**10. What is the smallest opening or full port valve size that the transmitter and receiver require? I want to know how large of a “Hot Tap” we must use. I want to verify that we could actual get permission to conduct them on our flare lines.**

**Answer:** Standard is a four inch pipe. If need be, for hot tap applications, we can go as small as 2.5 inches, as long as a four inch port mounting flange bolt pattern or an adapter is provided. Alternately the user may choose to drill extra mounting holes on the OFS flange extender (port side) to mate up with the smaller port flange.

**11. Is it possible to mount the transmitter and receivers in an explosion proof box? Have you done this? What are the impacts?**

**Answer:** Yes, it is possible, and should be relatively easy, due to their small size. While we have not done this yet, we cannot conceive of any possible negative effect in doing so.

**12. In one of Dr. Wang’s papers it indicates that the OFS is an approved equivalent Method 14 technology for compliance with the USEPA MACT rules. Do you have any documentation on this approval that we could have electronically?**

**Answer:** We have a faxed letter from the U.S. EPA granting approval for our optical scintillation technology in Method 14 applications. While not in electronic form, we could fax it to you.

**13. What is the lowest flow the OFS will measure? What is the accuracy at this low flow?**

**Answer:** We can measure flow as low as 0.01 m/s with slightly reduced accuracy of 10% below the stated 5% down to 0.03 m/s. Please note that we prefer to quote conservative / worst case numbers in our specifications as opposed to stretching the truth. This is not the case with some manufacturers.

**14. What is the highest flow the OFS will measure? What is the accuracy at this high flow?**

**Answer:** We currently limit our max to 100 m/s, with 5% accuracy -- same as the standard unit.

**15. What modifications are required to achieve these extended ranges? Have you done this? What is the impact?**

**Answer:** The modifications are in the DSP and microprocessor algorithms. These changes have been done and tested in-house. There is no negative impact to the standard performance of the extended range units.

**16. What is the smallest duct or pipe size that the OFS has been mounted on? Have you done this? What is the impact?**

**Answer:** As small as 12 inches diameter, with great results -- well within the specified operating performance.

**17. Do you have a maintenance manual for the OFS? Would you send us a copy?**

**Answer:** (See question 1) - Yes, we can send you a PDF version of the manual.

**18. Do you have a maintenance-training course for the OFS? Would you send us a course outline?**

**Answer:** Yes, we have and strongly recommend, a one or two day training course that familiarizes the user with the technology and the operation and maintenance of the OFS.

The training is typically done as one day of classroom training and one day of hands on training. The training is scheduled periodically at our facility in Maryland, or can also be done at the user's site. The course topics include:

- Overview of scintillation theory
- Theory of operation
- Optical alignment
- Routine maintenance
- Optical Flow Sensor design overview
- Mechanical installation & electrical interfacing
- Electronic calibration
- Troubleshooting application & system problems.